

**EXAMINER'S AMENDMENT & STATEMENT OF REASONS FOR ALLOWANCE***Table of Contents*

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*Amendments & Claim Status*

[1] This "Examiner's Amendment & Statement of Reasons of Allowance" is responsive to "Amendment (After Final)" (Amendment) received Sep. 1, 2009, and the attached "Interview Summary" (Interview) dated Oct. 5, 2009. Claims 1-2, 4-6, 14-17, and 19-22 remain pending; Claims 3, 7-13, and 18 cancelled.

*Response to Arguments**Remarks Persuasive regarding Rejections Under 35 U.S.C. § 101-103*

[2] Amendment at 7-8 and Examiner's Amendment from the Interview regarding rejected Claims 13 and 15-22 under 35 U.S.C. § 101; Claims 1-3, 5-9, 11-13, 15-17, and 20-22 under 35 U.S.C. § 102(b) as being anticipated by Malassiotis (Tracking the Left Ventricle in Echocardiographic Images by Learning Heart Dynamics, IEEE Transactions on Medical Imaging, Vol. 18, No. 3, 3/1999, pp. 282-290), rejected Claims 4 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Malassiotis in view of Qian (U.S. Patent No. 5,381,791) have been respectfully and fully considered, and are found persuasive.

*Claim Rejections - 35 U.S.C. § 101-103*

[3] In response to Amendment at 7-8 and the Interview, the previous 35 U.S.C. § 101-103 rejections are withdrawn.

***Formal Examiner's Amendment***

[4] This formal Examiner's Amendment is responsive to the telephone interview dated Oct. 5, 2009. See attached "Interview Summary".

Examiners may use an examiner's amendment to correct a non-compliant amendment filed by the applicant if the amendment would otherwise place the application in condition for allowance (e.g., a reply to a non-final Office action or an after-final amendment includes an incorrect status identifier). See MPEP § 714, subsection II.E, Examiner's Amendments.

M.P.E.P. § 1302.04.

[5] Authorization for this examiner's amendment was given in a telephone interview with Tom Kocovsky (Reg. No. 28,383) on Oct. 5, 2009.

This formal Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

*Amendment to the Claims*

1. (Currently Amended) An apparatus for segmenting a first series of 2D or 3D images obtained from a target object within a patient, comprising:

a transform calculator which calculates a series of transformations, wherein each transformation comprises an operation for defining a best fit between two images of ~~[[a]]~~ the first series of images, the transformations including: (1) a first transformation of the series of transformations between a first image of the series and a subsequent second image of the series and (2) a second transformation between ~~one of the first and second image~~ and a subsequent third image;

a segmenter which segments the first image of the first series is generated;

an image converter which applies the first transformation to the segmentation of the first image to generate a second image segmentation corresponding to the second image and applies the second transformation to ~~one of the first and second image segmentations~~ segmentation to generate a third image segmentation corresponding to the third image,

wherein the segmentation of the first series of images is applied to a second series of images.

2. (Previously Presented) The apparatus according to claim 1, wherein each transformation relates one of the series of images to an adjacent one of the images of the first series of images.

3. (Cancelled)

4. (Previously Presented) The apparatus according to claim [[3]] 1, wherein each of the first and second series of images are each collected from one or more of:

a magnetic resonance (MR) imaging system, a computer tomography (CT) imaging system, a nuclear medicine (NM) imaging system and an ultrasound (US) imaging system.

5. (Previously Presented) The apparatus according to claim [[3]] 1, wherein the first and second series of images are collected at different times.

6. (Previously Presented) The apparatus according to claim 1, wherein the images relate to a sphere-like organ and prior to establishing the first series of transformations, the first series of images is converted to a modified first series of images showings walls of the organ in a flat plane wherein opposing sides of said plane correspond to an inside and an outside of said organ, and that the said series of transformations are applied to the modified first series of images.

7-13. (Cancelled)

14. (Previously Presented) The method according to claim [[13]] 22, further comprising:

collecting each of the first and second series of images with a different one of: magnetic resonance (MR) imaging system, a computer tomography (CT) imaging, a nuclear medicine (NM) imaging and ultrasound (US) imaging.

15. (Previously Presented) The method according to claim [[13]] 22, wherein the first and second series of images are collected at different times.

16. (Previously Presented) The method according to claim 22, wherein the images relate to a sphere-like organ, the method further comprising:

prior to establishing the series of transformations, converting the first series of images to a modified first series of images showings walls of the organ in a flat plane wherein opposing sides of said plane substantially correspond to an inside and an outside of said organ, and wherein the series of transformations are applied to the modified first series of images.

17. (Currently Amended) A method for segmenting a first series of 2D or 3D images, the method comprising:

with at least one processor, calculating a transformation between a first image and a second image of the first series of images to determine a first transformation of a series of transformations that best fits the first image and the second image;

performing a first segmentation of the first image of the first series of images to obtain a first segmented image according to a selected segmentation process;

with at least one processor, applying the first transformation to the first segmented image to generate a second segmented image corresponding to the second image;

with the at least one processor, calculating a second transformation between the first image and a third image of the first series of images which second transformation best fits the first image and the third image with the processor;

with the at least one processor, applying the second transformation to the first segmented image and to generate a third segmented image corresponding to the third image; and

at least one of storing the second and third segmented images in a memory and displaying the second and third segmented images on a monitor,

wherein the segmentation of the first series of images is applied to a second series of images.

18. (Cancelled)

19. (Currently Amended) A method for segmenting a first series of 2D or 3D images, the method comprising:

with one or more processors, calculating a first transformation between a first image and a second image of the first series of images to determine a first transformation of a series of transformations that best fits the first image and the second image;

with the one or more processors, calculating a second transformation between the ~~second~~ first image and a successive third image of the first series of images which second transformation best fits the ~~second~~ first image and the third image;

with the one or more processors, performing a first segmentation of the first image of the first series of images to obtain a first segmented image according to a selected segmentation process;

with the one or more processors, applying the first transformation to the first segmented image to generate a second segmented image corresponding to the second image;

with the one or more processors, applying the second transformation to the ~~second~~ first segmented image to generate a third segmented image corresponding to the third image;

at least one of storing the segmented images in a memory and displaying the second segmented images on a display device,

wherein the segmentation of the first series of images is applied to a second series of images.

20. (Currently Amended) The method of claim 17, further comprising:  
calculating a series of the transformations among the first series of images prior to segmenting the first image,

wherein each image of the series of images comprises a wall of an organ in a flat plane, opposing sides of the [[at]] wall respectively corresponding to inside and outside the organ.

21. (Currently Amended) The method of claim 20, further including resampling the first series of images

22. (Currently Amended) A method for segmenting a first series of 2D or 3D images obtained from a target object within a patient, the method comprising:

with a processor, calculating a series of transformations in relation to [[a]] the first series of images including at least: (1) a first transformation of the series of transformations best fitting a first of the images and a subsequent second one of the images and (2) a second transformation of the series of transformation best fitting ~~one of the first and second of the image~~[[s]] and a subsequent third one of the images;

performing a segmentation on the first image of the first series of images to obtain a first segmented image;

with a processor, applying the first transformation to the segmentation of the first image to generate a second segmentation corresponding to second of the images and ~~applying~~ applying the second transformation to ~~one of the segmentation of the first image and the second image~~ to generate a third segmentation corresponding to the third image; and

at least one of storing the second and third segmented images in a memory and displaying the second and third segmented images on a display device,

wherein the segmentation of the first series of images is applied to a second series of images.

***Allowable Subject Matter***

[6] Claims 1-2, 4-6, 14-17, and 19-22 allowed.

***Reasons for Allowance***

[7] The following is an examiner's statement of reasons for allowance:

Regarding Claim 1, while the prior art of record teaches Claim 1, Apr. 7, 2009 (see Office Action at 4, Jul. 1, 2009), the prior art of record does not teach (i) a second transformation between the first and a subsequent third image; and (ii) wherein the segmentation of the first series of images is applied to a second series of images ("the segmentation of the first series of images" is interpreted from the specification as segmentations  $S_{1,i}$  for every  $i$  in the range 2 to  $n$  equivalent to the series  $S_{1,2}$ ,  $S_{1,3}$ , ...,  $S_{1,n}$  (i.e., the "first series of images" whereas the second series of images is the series  $S_{2,2}$ ,  $S_{2,3}$ , ...,  $S_{2,n}$ ).

Claims 17, 19, and 22 allowable by analogy. Claims 2, 4-6, 14-16, and 20-21 allowable by dependency.

[8] Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Positive Statement***

[9] Claims 1, 17, 19, and 22 comply with § 112 with regard to the second transformation. The original disclosure supports a second transformation between the first and subsequent third image. See Specification at p. 3, line 31 to p. 4, line 11 (identifying a transformation  $T_{1,i}$  and that "[t]he apparatus of the invention repeats this process for every  $i$  in the range 2 to  $n$  . . ."). The transformation  $T_{1,i}$  is repeated for every  $i$  in the range 2 to  $n$  is equivalent to the series  $T_{1,2}$ ,  $T_{1,3}$ , ...,  $T_{1,n}$  (i.e., the "first series of images" whereas the second series of images is the series  $T_{2,2}$ ,

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$T_{2,3}, \dots, T_{2,n}$ ). Thus, the second transformation  $T_{1,3}$  is only between the first and a subsequent third image, which the claims now support.

### ***Conclusion***

#### ***Citation of Pertinent Prior Art***

[10] The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US 5982909 A; US 6195445 B1; US 20010048753 A1; US 6346124 B1; US 6353679 B1; US 6396961 B1; and US 20020072671 A1.

[11] Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID P. RASHID whose telephone number is (571)270-1578 and fax number (571)270-2578. The examiner can normally be reached Monday - Friday 7:30 - 17:00 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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